

Estimation of Women's Job-Search Intensity and Opportunity-Costs of Children in Italy^(*)

Stima della partecipazione al lavoro delle donne italiane e costo-opportunità dei figli

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Riassunto: Scopo del lavoro è la determinazione del costo-opportunità dei figli per le donne italiane come differenza capitalizzata fra il reddito da lavoro percepibile rispettivamente in assenza e in presenza di figli. Utilizzando il dataset Bankitalia sui bilanci delle famiglie italiane il reddito da lavoro viene stimato congiuntamente alla probabilità di accedere al mercato del lavoro. Le analisi differenziali condotte in relazione alla tipologia professionale mostrano che il costo-opportunità dei figli cresce con il livello di istruzione e con l'esperienza professionale, e decresce con l'età della donna al parto.

Keywords: Opportunity-Costs of Children, Endogenous Dummy Variable Estimator.

1. Introduction

In developed countries, childbearing women often withdraw from the labour market, thereby foregoing earnings and incurring opportunity costs, that depend, among other things, on several socio-economic and institutional factors, like household income, direct costs of child-care, education, women's opportunities in the labour market, etc. In this paper, we will try to estimate precisely how large these opportunity costs are, following the lines set forth in a few recent studies (Davies and Joshi, 1994 and Dankmeyer, 1996), and taking into account such stratification variables as the mother's employment status and education level. Our estimates extend up to the age of 60: they cover a sizeable proportion of a woman's potential earnings, but they miss the losses child-rearing produces in terms of pension benefits. We formed our data set from three recent Bank of Italy surveys on Italian household budgets (1993, 1995 and 1998), selecting a sub-sample of 1,441 families, with or without children, and with at least one adult woman, aged 15 to 60.

2. Model, estimation procedure and criteria

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To estimate and evaluate the cost of the time spent by Italian women on child care, we adopted a two-stage estimation procedure. The first stage implies two “reduced-form” estimates: 1) a binary-*probit* model of labour force participation and 2) a binary-*logit* regression of “labour intensity”, i.e. of full-time or part-time engagement in the labour market. The second stage consists of an OLS structural-form estimation of the hourly wage, the participation probability and the work-intensity. To allow for the fact that women with higher earning potential are more likely to participate in the labour market, we used the first step probit residuals as “Heckman corrections” in the hourly wage estimation (Heckman, 1974). Furthermore, the explained working-intensity of the *logit* regression becomes an additional independent variable in the OLS regression on hourly wages. To estimate these wages we assumed a Cobb-Douglas function, that is flexible enough to allow for possible non-linear relations between the dependent variable and the regressors. The final structural-form estimates, respectively of the participation probability and of the work-intensity, are obtained by including the explained hourly wages as regressors in the *probit* and in the *logit* regressions.

Estimated hourly wages, participation probability and work-intensity can be used to calculate the opportunity-costs of children

At this point, it is preferable to distinguish between “working” and “non-working” women. For working women, the opportunity costs of children are calculated as the difference between the potential life-time labour income in two scenarios, with and without children. For non-working women the opportunity-costs are given by the difference between the expected wage without children and the “reservation” wage, i.e. the minimum salary that would induce a woman to work. By using the estimation model results, the opportunity-costs, $OC(x)$, at age x , are given by the following expression:

$$OC(x) = \sum_{x=18}^w [(Y_0 - Y) p_x (1+r)^{w-x}] \quad (1)$$

where: Y and Y_0 are the expected yearly income, respectively, with and without children; p_x is the probability to be alive at age x ; r is the long term real interest rate; w is highest attainable age; $x = 18$ is assumed to be the age when a woman may start to work. For working women, Y and Y_0 are given by the following expressions:

$$\begin{aligned} Y &= \hat{w} \cdot H \cdot W \cdot p \cdot i \\ Y_0 &= \hat{w}_0 \cdot H \cdot W \cdot p_0 \cdot i_0 \end{aligned} \quad (2)$$

Where: $\hat{w}$ e $\hat{w}_0$ are the estimated hourly wages, respectively, with and without children; H are the average working hours in a week; W the number of working weeks in the year; p and p_0 are the estimated labour market participation probability, respectively, with and without children; i and i_0 are the estimated work-intensity, respectively, with and without children. For non-working women, Y and Y_0 are obtained by modifying the expressions (2) in the following way:

$$\begin{aligned} Y &= \hat{w}(r)_0 \cdot H \cdot W \cdot (1 - p_0); \\ Y_0 &= \hat{w}_0 \cdot H \cdot W \cdot p_0; \end{aligned} \quad (3)$$

where $\hat{w}(r)_0$ is the reservation wage obtained from the hourly wage estimates by imposing $i=0$ (labour intensity).

3. Estimation, results and simulations

Table 1 shows the results of the reduced-form *probit* and *logit* regressions (first stage), and equation (4) contains the estimation results for the hourly wages (second stage).

Table 1: First stage “Reduced-form” estimates

Labour market participation <i>probit</i> estimates (Dependent variable =1 if the woman participates in the labour market)				Work-intensity <i>logit</i> estimates (Dependent variable =1 if the woman works full-time)			
<i>Variables</i>	<i>Coeff.</i>	<i>S.E.</i>	<i>P-value</i>	<i>Variables</i>	<i>Coeff.</i>	<i>S.E.</i>	<i>P-value</i>
Constant	-1.6487	0.3939	0.0000	Constant	-7.7162	1.1963	0.0000
Age	-0.0202	0.0064	0.0016	Number of components of the family	0.6089	0.3311	0.0659
Regional labour market efficiency indicator	0.0288	0.0074	0.0000	Household income/equivalent income	1.9131	0.6315	0.0024
Income woman / household income	1.9002	0.1462	0.0000	Number of hours of work in the week	0.1500	0.0165	0.0000
Number of children	-0.2827	0.0543	0.0000	Number of children between 0 - 3	-1.7681	0.7791	0.0232
Experience/age	4.9188	0.3076	0.0000	Number of children between 4 - 15	-1.8703	0.8635	0.0303
Education level	0.4712	0.0642	0.0000	Number of children between 16 - 18	-2.0890	0.9926	0.0353
-	-	-	-	Interaction term: age-total number of children	0.0396	0.0180	0.0282
-	-	-	-	Public-private sector	1.5387	0.3358	0.0000
Sample size: 1441; Cox-Snell 0.37; goodness of fit χ^2 (6) = 1250; p-value = 0.000				Sample size: 636 ;Cox-Snell 0.301;Goodness of Fit χ^2 (9)= 635.7; Hosmer-Lemeshow test 4.069 p-value = 0.8508			

The hourly wages estimates, at the second stage, are the following:

$$\ln \hat{w}(r) = 1.9730 + 0.788x_1 + 0.183x_2 + 0.712x_3 - 0.573x_4 + 0.634x_5 + 0.138x_6 - 0.249x_7 \quad (4)$$

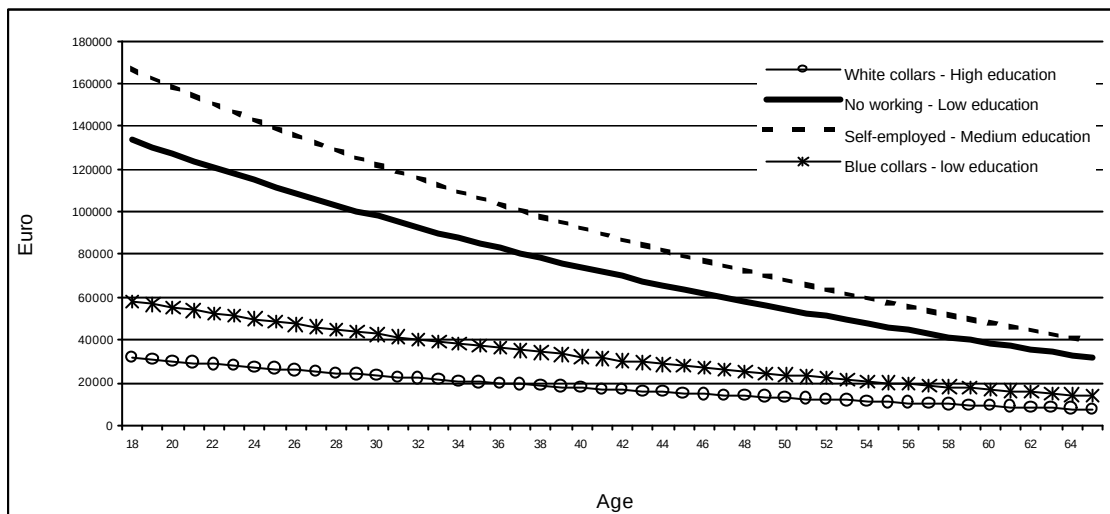
$\begin{matrix} (0.130) & (0.074) & (0.04) & (0.057) & (0.169) & (0.073) & (0.024) & (0.045) \end{matrix}$

$R^2 = 0.437$; $R^2 \text{ corr.} = 0.430$; $F = 65.46$; $p\text{-value} = 0.0000$

where the meaning of the regressors x_i included in equation (4) in an increasing order is reported below: 1) Log (education level); 2) Log (Regional labour market efficiency); 3) Log (household income/equivalent income); 4) Log (income woman/ household income); 5) Log (experience/age); 6) Log (Heckman correction); 7) Log (Explained work-intensity). Our estimates indicate that the presence of children reduces both labour probability and labour intensity. However, the sign of the coefficient “Interaction age-number of children” (Table 1) suggests that the work-intensity depends progressively less on the presence of children as women age. In the OLS estimation of hourly wages, the sign of the coefficient “Log (Explained work intensity)” in equation (4) shows a

negative correlation between the level of hourly wages and work-intensity. This may be a consequence of the institutional aspects of the Italian labour market, where hourly wages for part-time workers may be as high as, or even higher than, those of full-time workers. The structural-form estimates of the probability of participation in the labour market and of the work intensity are not reported here, but these results are used to calculate the opportunity-costs of children up to age x , $OC(x)$, for different women's profiles.

Figure 1: Overall, discounted opportunity-costs, $OC(x)$, for one child, for different ages at child birth and different characteristics of the woman. Italy, 1993-98.



The “short-term” differential $Y_0 - Y$ is generally a percentage of 30% of the yearly income of a woman with two children. This percentage is lower (about 15-20 %) when the woman has only one child. Generally the $OC(x)$ level is higher the earlier a woman bears her first child, because motherhood prevents a woman from progressing in her career, and young childbearing mothers never catch up. Figure 1 shows different profiles of women with one child who bear their child at the age of 18. Women's education level and type of occupation are two important factors in determining the opportunity-costs of children, but the second affects the $OC(x)$ evolution more. The differential analysis shows that $OC(x)$ mainly depends on whether the woman is a dependent worker or self-employed, and on whether she is a blue or a white collar worker. Furthermore, within a specific activity sector, opportunity-costs increase for higher levels of education mainly at younger ages.

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